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ABSTRACT

In 1983, an 11-member task force of teachers and school administrators reviewed the general state of the art of microcomputer applications in education in order to make recommendations for the River East School Division 9 in Winnipeg, Manitoba, Canada. The group recommended that the school division pursue a deliberate and systematic plan for implementing computer-related learning activities in grades K-12 in all schools. Specific recommendations included the following items: (1) committees of teachers should select and evaluate software and courseware; (2) every elementary school should offer LOGO and word processing; (3) standards for purchasing hardware should be established and reviewed annually; (4) one computer learning station should be available in every elementary classroom and special education class; (5) senior high guidance services and libraries should have access to computers; (6) workshops should be planned for administrators and special education teachers; and (7) the administration of accounts and records in the central office and in schools should be computerized within two years. A proposed budget and revenue sources were given for the three year program implementation period. (GDC)

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**TASK FORCE REPORT
ON
MICROCOMPUTER APPLICATIONS
IN EDUCATION**

September, 1984

River East School Division #9

Winnipeg, Manitoba

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MICRO TASK FORCE

.... 1

A Microcomputer Task Force was set up by the River East Superintendent of Education in June 1983.

The Task Force included the following members:

- | | |
|---------------------|--|
| Dr. Robert Cross | - Assistant Superintendent (Curriculum) |
| | - Chairperson of the Microcomputer Task Force |
| Mrs. Dona Burrton | - Resource Teacher at John Pritchard |
| | - Piloting micro learning activities |
| Mr. Roger Carbotte | - Senior High Math teacher at Kildonan East |
| | - Member of the River East Microcomputer Project |
| Mr. Arthur Funk | - Vice Principal at Salisbury Elementary School |
| | - Member of the River East Microcomputer Project |
| | - Part-time Computer Consultant |
| Mr. Lloyd Gulash | - Junior High Social Studies teacher at Chief Peguis |
| | - Piloting computer applications in Junior High |
| Mr. Orest Lazaruk | - Principal of Robert Andrews |
| Mrs. Sheila Redekop | - Resource and ESL teacher at Princess Margaret |
| | - Piloting micro learning activities |
| Mr. Ron Shewchuk | - Vice-Principal at John de Graff |
| Mr. Moe Tobin | - Principal of Dr. Hamilton Elementary School |
| | - Member of Microsoft Committee |
| Dr. Otto B. Toews | - Deputy Assistant Superintendent (Curriculum) |
| Mr. Waldi Wawrykow | - Vice-Principal of River East Collegiate |
| | - Administrative applications of microcomputers |

THE MANDATE

... 2

The mandate of the Task Force as outlined by the Chairman, Dr. R. W. Cross, included the following:

- to review the state of the art of microcomputer applications in education in and outside of the Division.
- to identify goals and aims for microcomputer applications in education.
- to identify appropriate program applications for K-12.
- to identify appropriate microcomputer applications in support services and administration.
- to identify guidelines for staff development.
- to identify the acquisition of appropriate hardware and peripherals.
- to identify appropriate guidelines for the acquisition of software and courseware.
- to identify appropriate technical support services.
- to identify an appropriate implementation schedule.

The Task Force worked intensely over a three-month period to respond to the mandate. Weekly meetings were held, schools in and outside the Division were visited to observe programs in operation, oral and written submissions were received in several open meetings, some of the research literature was reviewed, and resource people from the Department of Education and other school divisions were invited to address the Task Force. After conducting intensive debates, the members of the Task Force developed the recommendations outlined in this Report.

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INTRODUCTION

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.... most students can attain a high level of learning capability if instruction is approached sensitively and systematically, if students are helped when and where they have learning difficulties, if they are given sufficient time to achieve mastery, and if there is clear criterion of what constitutes mastery.

Bloom 1976

It is encouraging to hear a renown person like Benjamin Bloom remind us that "most students can attain a high level of learning capability". However, the "ifs" which he attached to this promising claim are sobering. They include:

- if instruction is approached sensitively and systematically.
- if students are helped when and where they have learning difficulties.
- if they are given sufficient time to achieve mastery.
- if there is clear criterion of what constitutes mastery.

It is these "ifs" which prompt teachers to keep on searching for more and more ways to help students attain a high level of learning. Teachers constantly search for new learning materials, teaching strategies, management practices and technologies which might help children.

Most recently the quest for new aids for students has led to the use of microcomputers in schools. A rapidly increasing number of teachers are introducing microcomputers into the classroom with the "hope" that this technology will help children learn to think or acquire basic skills. Some teachers have begun to laud the potential of micros to assist children in one way or another. Others have raised concerns about the possible replacement of the teacher by a machine. It was soon evident that educators would have to review the implications of

micros in the classroom carefully to determine their potential contributions to provide quality education even though not much is known about the educational outcomes of using microcomputers in the classroom. In fact, Sheingold, Kane and Endreweit reported as recently as November, 1983, as follows:

"Yet, in 1983, there is not much more knowledge than there was for those pioneering in 1980, about the educational outcomes of using microcomputers. We need to begin requiring such knowledge very quickly in order to help guide an innovation which is growing rapidly" 1

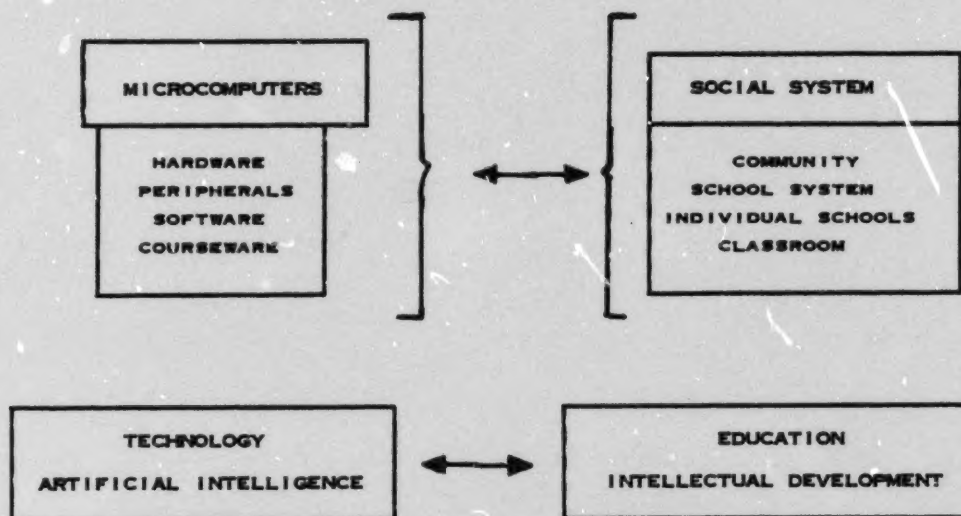
The Task Force acknowledges that much more should be known about the educational outcomes of microcomputers. However, it is prepared to make some tentative recommendations for a careful introduction of microcomputers in the schools at all levels in River East School Division. These recommendations are based on a variety of sources of information: personal experience of Task Force Members, submissions to the Task Force, classroom visitations, and readings based on the experiences and studies of people around the world. It is also recognized that this area should be reviewed regularly and frequently to avoid pitfalls and pursue quality education. It is with these qualifications in mind that the Task Force prepared the following policy recommendations.

1. Sheingold, Kane, and Endreweit, "Microcomputer in Schools: Developing a Research Agenda". Harvard Educational Review, Vol. 53, No. 4, November 1983, p 431

1. PROBLEMS AND CONCERNS

The problems and concerns need to be viewed from several perspectives. Any introduction of new technologies in education must take note of the complex interface among technology, society, and school. In other words, the introduction of a technology in education must be considered in the light of larger socio-cultural developments. Technologies interact with social systems. Included in the social system are the community, the school system, the individual schools and the classroom. Beliefs, events and decisions concerning the role of a technology evolve from all levels of the social system.

In recent years, the development of microcomputers and artificial intelligence has created numerous new interactions between the new technology and the social system. The interaction between the new technology, microcomputers and the social system can be illustrated as follows:



Many of these interactions have significant implications for the school system and the classroom. It is the responsibility of educators (policy makers, administrators, teachers, researchers) to explore the educational opportunities available from the new developments and to avoid any abuse or interference with quality education that may result from the introduction of microcomputers in the classroom.

It follows that a comprehensive report on the impact of microcomputers should deal with the following three issues:

- occupational implications
- impact on the school system
- implications for the classroom

It is not possible within the scope of this Report to review the occupational implications of microcomputers. Limited reference will be made to the impact of microcomputers on the school system primarily because very little is known today about what those implications might be. It is generally agreed that the microcomputer is likely to have a significant impact on the school system but that is where the agreement ends. That leaves the final issue - implications for the classroom. The classroom is the first line of exposure to the introduction of microcomputers and therefore this question must be addressed.

The introduction of microcomputers in the classroom should take the following issues and concerns into account. These questions should be addressed carefully to ensure appropriate applications of microcomputers in education. The main questions include:

- What is the educational value of micros?
- What are the best ways to use them?
- Are teachers adequately prepared to use them?

- Are all children (eg., boys and girls) given equal access to micros?
- What hardware and software is most appropriate for educational purposes?

These are fundamental issues which must not be overlooked in the "computer rush". They must be resolved in the light of the goals and aims of the Division. In short, the issue is not whether all schools have micros but whether all schools pursue quality education. If micros can advance quality education in a unique and equitable manner, then it is the responsibility of educators to make a sincere effort to introduce the use of micros in education.

2. CURRENT STATUS

The current status of the use of microcomputers in education does not reflect the explosion of the "Information Revolution" which is taking place in industry, commerce, government and the professions. In Canada and the United States, the proportion of people in the work force occupying information jobs has risen to approximately forty percent.² The various categories of information workers include information processors (63%), information producers (19%), and information distributors (12%). The Information Revolution involves the evolution and diffusion of information. This includes the putting together of computing and communication technologies into a simple powerful system, with vast capabilities for computation and analysis as well as access to enormous amounts of information. The number of computers in use in Canada has increased tremendously from 1000 in use in 1915 to 37,000 in 1979 to countless numbers in use today. It is to this technological change and related cultural changes in the home and the workplace to which educators must respond.

Educators are faced with two basic questions concerning the use of microcomputers in schools. First, what should schools do to prepare children for the "Information Revolution"? Second, how may school adapt the technological change so that it may be used to respond to these questions by reviewing the current status of microcomputers in education and identifying appropriate programs and services that could be available through microcomputer applications in education?

2. A. R. Wells, "The Information Revolution: Background and Implications". Orbit 67, Toronto, Ontario Institute of Studies: Vol 14, No. 3, October, 1983, p.22

General Situation

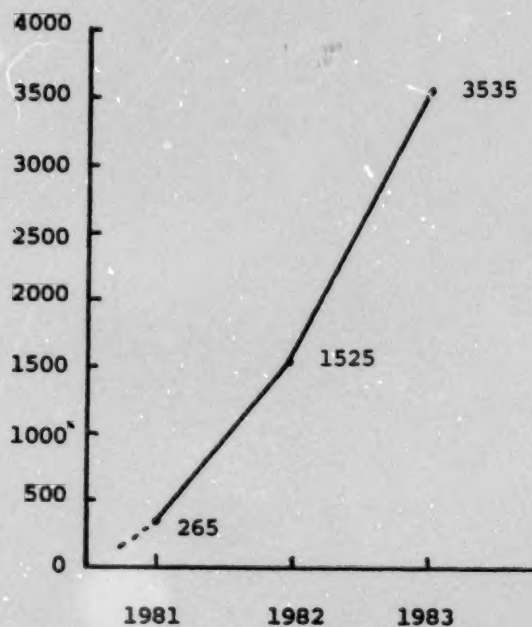
The use of microcomputers is being introduced rapidly in many schools in the United States. The chart below represents the top ten micro-using States in 1982. It points out that the percentage of schools using micros ranges from 27.5% to 79.6%.

TOP 10 MICRO-USING STATES, 1982

STATE	TOTAL W MICROS	TOTAL SCHOOLS	% WITH MICROS
CALIFORNIA	2,901	7,605	38.1 %
NEW YORK	2,387	4,087	58.4
TEXAS	1,931	5,459	35.3
ILLINOIS	1,815	4,073	44.5
MICHIGAN	1,740	3,485	50.1
MINNESOTA	1,267	1,591	79.6
PENNSYLVANIA	1,129	3,489	32.3
OHIO	1,103	4,000	27.5
FLORIDA	1,083	2,182	49.6
NEW JERSEY	876	2,353	37.2
ALBERTA	857	1,680	51.0
TOTAL OF ALL STATES	30,859	83,648	36.8 %

In Canada, Alberta seems to be leading the way. In a two-year period from the spring of 1981 to the spring of 1983, the number of microcomputers in Alberta schools has increased from 265 to 3,535 which represents an increase of 1245%.

Table 1. Microcomputers in Alberta Schools



Similarly, Ontario and Quebec are making major commitments to introducing micros in education. The Ontario Ministry of Education announced that it will purchase \$10 million dollars worth of microcomputer equipment for distribution to Ontario schools. In 1983, Ontario will spend \$1.3 million dollars on the evaluation and prioritization of software. \$5.56 million will be used in 1986 to provide development grants to produce and purchase licenses to allow unrestricted use of materials by Ontario schools.

The Quebec Ministry of Education plans to invest \$150 million in the next five years to place microcomputers in classrooms and to produce software written in French. Other provinces have also been very active as is evident from the chart below.

PROVINCE	STUDENTS	MICROS
BRITISH COLUMBIA	520,000	2,500
ALBERTA	440,000	3,535
SASKATCHEWAN	200,000	1,300
MANITOBA	200,000	1,610
ONTARIO	2,000,000	8,000
QUEBEC *	1,037,000	800
NEW BRUNSWICK	125,000	1,000
NOVA SCOTIA	180,000	800
P.E.I.	25,000	150
NEWFOUNDLAND	135,000	200

* DOES NOT INCLUDE CEJEP'S (JUNIOR COLLEGES)

The introduction of the use of microcomputers in Manitoba schools was of particular interest to the Task Force. These developments can be summarized as follows.

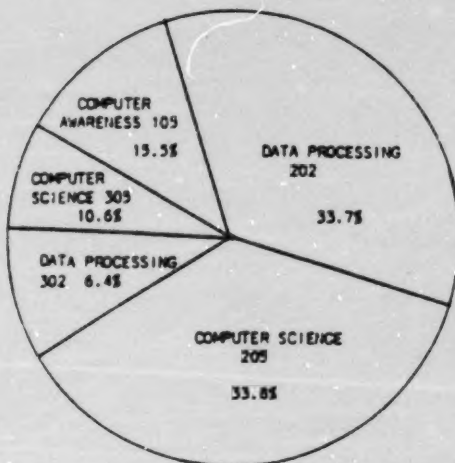
Manitoba Situation

The application of microcomputers in education in Manitoba has been outlined in some detail in the "Manitoba Department of Education Survey of Existing School Computing, 1983". The results of this survey are compared to the results of the surveys conducted in 1977-78 and 1980-81. The use of microcomputers in 1982-83 has increased by 450% of the

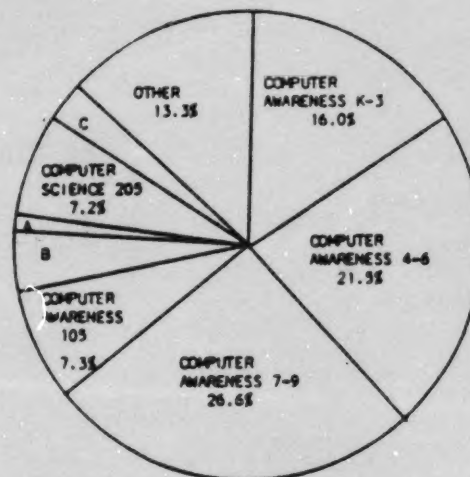
number of schools using microcomputers in 1980-81. The number of micro-computer units used in 1982-83 increased by more than 700% over 1980-81. The number of students enrolled in computer studies in 1982-83 increased by 130% over 1977-78. As is pointed out in the Survey Report, educational computing in Manitoba is experiencing a cycle of truly explosive growth.

Not only has the use of microcomputers increased but enrollment patterns have changed dramatically as is apparent from the following graphs which identify a major new thrust in microcomputer applications in K-9. The new emphasis is on the introduction of programs in Computer Awareness K-9 which now represents 64.1% of all computer studies in K-12.

1977-78 COMPUTER STUDIES
ENROLLMENT PATTERNS
(2 710 Students)



1982-83 COMPUTER STUDIES
ENROLLMENT PATTERNS
(35 783 Students)



A - DATA PROCESSING 302 1.2%
B - DATA PROCESSING 202 4.3%
C - COMPUTER SCIENCE 305 2.5%

The percent of all Manitoba students receiving instruction in computer studies at each level is summarized in the following chart. Instruction seems to be focused on four areas: Computer Awareness 4-6 (16.4%), Computer Awareness 7-9 (20.1%), Computer Awareness 105 (17.0%), and Computer Science 205 (17.5%). Even in these areas only one in five students or less are engaged in computer studies. More important, these statistics do not indicate what students enrolled in these courses are doing and how educationally valuable the courses are in terms of preparing students for careers or developing their cognitive abilities and skills.

ENROLLMENT DATA FOR COMPUTER STUDIES COURSES IN MANITOBA SCHOOLS 1982-83

	# SCHOOLS OFFERING	# SCHOOLS RESPONDING		ENROLLMENT	ENROLLMENT IN LEVEL	% OF LEVEL ENROLLMENT
COMPUTER AWARENESS K-3	67	268	25.0%	5 729	62 021	9.2%
COMPUTER AWARENESS 4-6	102	266	38.3%	7 681	46 731	16.4%
COMPUTER AWARENESS 7-9	104	187	62.3%	9 503	47 302	20.1%
COMPUTER AWARENESS 105	59	143	41.3%	2 624	15 396	17.0%
DATA PROCESSING 202	46	143	32.2%	1 544	14 804	10.4%
DATA PROCESSING 302	25	139	18.0%	425	19 132	2.8%
COMPUTER SCIENCE 205	70	143	49.0%	2 591	14 804*	17.5%
COMPUTER SCIENCE 305	48	139	34.5%	911	15 132*	6.0%
OTHER	90			4 775		
TOTAL	302			35 783	201 386	

NOT COUNTED TWICE IN TOTAL

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What does all this mean as perceived by the schools responding to the survey? The 1983 Survey Report summarizes the conclusions as follows:

	#
- more software/courseware and their evaluations required	45
- more computer-related curriculum information required	45
- main use of computers in our school is remedial, enrichment, teacher awareness, etc.	37
- more hardware required	31
- more in-service/professional development required	28
- more funding required	25
- more individual consulting required	21
- computers are a definite asset in our schools	18
- more information on integrating computers into existing curriculum required	10

According to these Survey results, the most urgent need seems to be in the area of software and curriculum materials. It is significant that least concern is expressed about integrating the use of computers into existing curriculum. Does this reflect the limitations of the hardware, software, teacher training or all of these factors?

The Department of Education has taken several steps to support schools with introducing microcomputers. The Department assists CAL (Manitoba Computer Assisted Learning Consortium) in the development of computer-based instructional programs. The Department is also making the MECC program available to schools at a moderate cost. The Department has established Advisory Committees in the following areas.

- computer-based educational courseware
- educational computer hardware
- professional development

These Advisory Committees will submit their final reports to the Assistant Deputy Minister by Spring of 1984 (Appendix A).

Many school divisions in Manitoba are taking steps to introduce the use of computers in schools (Appendix B). What is River East doing?

River East Situation

A review of the introduction of microcomputers in River East schools reflects a rapid expansion of the use of microcomputers especially in K-9. Presently, all but two schools have introduced the use of microcomputers (See Appendix C). The applications are concentrated at the Senior High level where Department of Education approved courses are in place. Two Junior High schools have established labs to offer a Computer Awareness program to all students. The Elementary Schools have anywhere from 1-6 microcomputers depending on the size of the school and the priority placed on the use of microcomputers.

What is more important, however, is the use which is made of available microcomputers. Significant developments have taken place in the past three years (See Appendix D and E). At the Senior High level, all approved courses have been introduced at each school. The use of mainframe is under review. Considerable software has been reviewed for recommended use. Plans are underway to network the use of microcomputers in Senior High. Qualified staff are available at each Senior High.

The introduction of the use of microcomputers at the Junior High level is more limited due to limitations of available hardware, software, courseware and trained staff. Over the past three years, considerable developments have taken place. Currently, two schools offer Computer Awareness courses to all students 7-9 and the other

schools offer it to as many students as permitted by the limited number of available microcomputers. The students are introduced to Basic and LOGO, An increasing amount of suitable software has been identified and made available. A transition from the use of cassettes to disc drives is taking place. Some applications to the regular program (especially mathematics) are being introduced. Considerable use is made of microcomputers in the resource programs.

Substantial developments have taken place at the Elementary level even though the number of available microcomputers is quite limited. The use of CAL expanded rapidly over the past three years as more and more software became available. Logo is rapidly replacing Basic in many schools. More and more classroom based applications are taking place. Word processing is emerging as an important application. Schools are requesting disc drives, printers and color monitors coupled with more powerful microcomputers like the Apple II^e to avail students with the superior software currently being developed. A classroom based model for incorporating the use of microcomputers in the curriculum predominates.

In summary, rapid changes in the application of microcomputers in education have taken place in the Division schools (Appendix C). These changes reflect a move towards more complex applications - Logo, word processing and problem solving. These developments reinforce the need to provide more support to schools in all three areas - hardware, software and professional development. Many worthwhile learning activities K-12 have been identified and are being used by Division teachers. These should be supported so that more and more students may enjoy the benefits of microcomputer applications. This is the challenge to which the Task Force

should respond.

3. DIVISION GOALS AND COMPUTERS

Quality of education in River East School Division has been described in terms of five aims. These aims can be summarized as follows:

- Communication - a basic activity for the sharing of information, ideas and feelings. Students are encouraged to develop the confidence, skills and satisfaction of effective communication.
- Personal and social development - the development of a sense of personal worth and adequacy as a contributing member of society.
- Creativity - encouraging the development of inventiveness and imagination.
- Systematic thinking - encourage cognitive development to facilitate problem solving, decision making and attitudes of inquiry.
- Skill development - encourage the development of a wide range of learning skills.

The five developmental areas are interrelated and collectively represent the essential purpose of quality education. A substantial body of research in psychology, philosophy and education could be cited in support of these goals.

The fundamental question is: How can the introduction of microcomputers enhance the implementation of these five developmental goals and aims? Although the research findings on microcomputer applications in education are inconclusive to date, some promising applications have been identified. For example, through the use of computer languages such as Basic, Logo, or Pascal students can manage and interact with a vast body of information and ideas. Couple the use of micros with

4. METHODOLOGY

The Superintendent, in consultation with the Assistant Superintendent - Curriculum, decided to use a Task Force to develop a proposed three year action plan for the implementation of micro-computer applications in River East School Division. The Task Force was used in the way as described by Peters and Waterman in In Pursuit of Excellence. It was made up of a group of educators who were committed to conduct a careful concentrated study over a short period of time and to prepare an action plan including procedures, time line, staffing and budget. This action plan would be taken through the political process and implemented as soon as it has been approved.

The Task Force, which had representation from administrators and teachers at the elementary, junior high and senior high levels, took the following steps to conduct a study of the current situation as well as to make recommendations for the systematic implementation of microcomputer applications K-12 over a three year period.

1. Task Force Meetings

The Task Force met regularly over a four month period to discuss the issues related to microcomputer application in education.

2. Review of the Literature

Selective and representative articles on the theoretical and applied issues in microcomputer applications were reviewed by members of the committee and discussed.

3. Division Study

A comprehensive study of the hardware, software, programs and professional development activities in the Division was conducted. The results of this study are included in the Report.

4. Resource People

Resource people from other school divisions and the Department of Education were invited to address the Task Force and to discuss theoretical and implementation issues.

5. Open Meetings

Several open meetings were scheduled to hear submissions from teachers, administrators and the community. A written

report was requested from each person who submitted an oral report. Submissions were requested from the teachers and administrators associations.

6. Planning Committee

A planning committee of four people was established to plan and organize the Task Force activities.

7. Writer

One member was assigned to the Task Force to write the several drafts, including the final draft, of the Task Force Report.

8. Political Reaction

The Task Force Report was submitted to the teachers' association by the Superintendent before it was forwarded to the Board of Trustees.

9. Final Report

A final report was prepared subsequent to the Board's response to the Report.

10. Dissemination

The Final Task Report was sent to each school and discussed with the Principals. It serves as a three year implementation plan commencing in September 1984.

peripherals such as networks and modems, a person can gain instant access to information banks all over the world.

Second, creativity can also be fostered through the use of micro-computers. An increasing number of programs provide students with imaginative problem-solving situations. Acquiring the use of computer languages enables students to invent instructions for computers thus making a computer construct designs (eg., Logo) or use programs to solve problems.

Although some concern has been expressed that computers encourage students to interact with machines and not with people, educators have observed some important social interactions among students using computers. Students using computers to solve problems in mathematics or science, tend to check with each other and help each other in solving problems. In other words, some of the student/teacher interactions in the classroom are replaced by student/student interactions. Students get the personal satisfaction of helping each other. In other instances, especially in elementary school, the use of computers is coupled with a tutorial mode of teaching. A student proctor will frequently work with a student on a computer. The proctor assists the student in the use of the computer so that the tutee can learn (eg., solve a math problem) with the aid of a computer. In fact, more and more educators note that computers can motivate students, generate interest, build self-esteem and foster self-control in students. Potentially, the computer might change the teacher-student relationship. When students and teachers have ready access to the same information base and problem solving techniques

through the use of computers, the teacher is no longer the "expert" who shares his/her knowledge with the student. A situation can be created where both, the student and the teacher, are learning. This would be a different kind of learning environment which may prove stimulating and challenging for everyone.

Systematic thinking can also be provided through the use of computers. Researchers, like Papert of MIT, have pointed out that an appropriate use of Logo can promote cognitive development. The invention and development of a program, through the use of Basic or any other language, requires highly developed and systematic thinking.

Skill development can also be promoted through the use of computers. A variety of skills must be acquired to operate a computer. More important, however, is the use of microcomputers in acquiring a functional knowledge of basic skills such as computational skills. Numerous facinating and imaginative drill and practice programs are available to students who are weak in basic skills. Drill and practice still continues to be one of the more common uses of computers. Resource programs as well as programs for poorly motivated students (eg., poor attenders) have incorporated the use of computers.

These are but a few examples of the ways in which computers are used in schools. They illustrate how computers can be used to promote the five Division goals. However, it is not enough to be able to cite one or two examples of microcomputer applications in schools. Integrated sets of learning experiences in the form of projects, courses or programs must be developed for tne effective use of computers in schools.

COMPUTERS IN EDUCATION

.... 23

1. COMPUTER PROGRAMS, COURSES AND PROJECTS

Computer applications in education have taken different forms. These have been classified by the Task Force of the Department of Education in Manitoba as computer awareness, familiarization, computer literacy, introductory programming, advanced programming, and computer assisted learning. They have been described in "The Report of the Computer Awareness Task Force Grades K through 12" (March 1982) as follows.

Computer Awareness

The Task Force considers that computer awareness includes: familiarization with computers (what they can and cannot do), hands-on experiences (learning to interact and communicate with computers), learning to use computers for problem-solving, and computer-assisted learning to a small degree in carefully selected circumstances, or as part of the hands-on experiences.

The overall goal of computer awareness is to promote an understanding of computer applications to problems and situations in academic, business, and social arenas. Computer awareness incorporates applications in these fields and assesses the impact upon society by computer technology and applications.

Familiarization

Familiarization involves the recognition of the non-specific reflection upon social implications of computer technology. Familiarization may not necessarily require that the student interact with the hardware or software.

Computer Literacy

Computer literacy is that part of awareness that involves the manipulation of hardware, software, courseware, and problem-solving techniques in order to manage the computer. Computer literacy is a part of computer awareness which may include: manipulative skills (using computer, programming), social implications, attitudes and values, and cognitive skills allowing communication with knowledgeable programmers.

Introductory Programming

Introductory programming is that part of literacy that involves the simplest program development, writing, and usage.

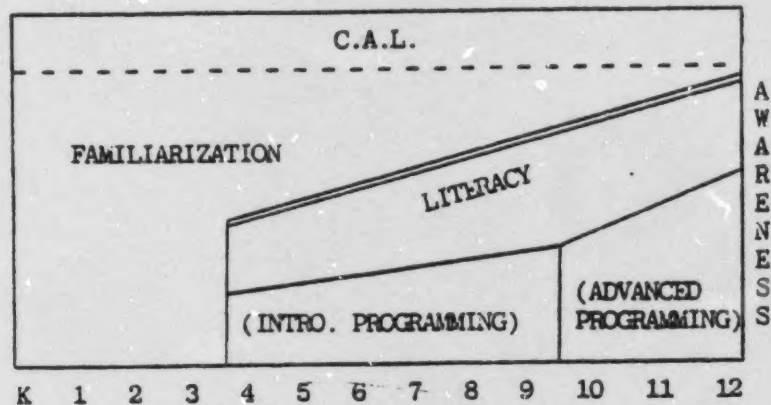
Advanced Programming

Advanced programming involves the understanding and use of programming to deal with complex problems through the dynamics of a computer language.

Computer-Assisted Learning •

Computer assisted learning (CAL) refers to the application of computer technology in the areas of drill and practice, tutorial instruction and simulations. Individual needs are met through unique rates of learning established learning theory.

The Department of Education Task Force suggested that the various types of programs be distributed across K-12 as follows:

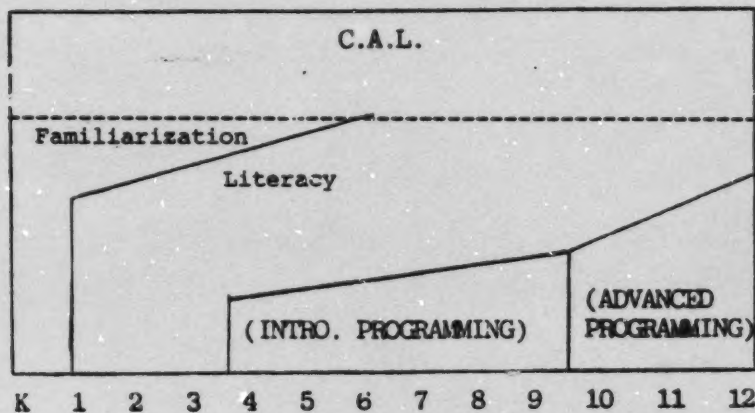


MANITOBA AWARENESS MODEL

It is understood that the emphasis on the various approaches to computer education outlined above will vary over the next few years. As more and more children in elementary schools are exposed to computer related learning activities, less emphasis will be placed on computer literacy in later grades. The question is: At what age should schools introduce the use of computers? If schools are free to do as they please, some children will be introduced to the use of computers in school and some will not. Is this fair to the students? How can Junior High schools and Senior High Schools offer appropriate programs to students with such differing backgrounds? It is difficult to plan appropriate programs at the secondary level under such conditions. Nor is it fair to all students. Some planned computer literacy is necessary for elementary schools. Appropriate follow-up programs should be implemented at the secondary level.

The Task Force encountered its most difficult challenge at this point because it seemed virtually impossible to recommend programs, courses and integrated learning activities in an area which is so new and changing so rapidly. Before the Task Force identified guidelines for computer related learning activities it noted two changes which should be made in the Manitoba Awareness Model. First, the use of CAL probably is not an unchanging variable as reflected in the Model. As the software improves in quality and quantity, more CAL is likely to be used in classrooms. Second, literacy probably should be extended to lower grades and rapidly replace familiarization activities.

Consequently, a more appropriate model today might be drawn as follows:



This model may well have to change to reflect new technological innovations. For example, the time may come when students do not need to learn to program because computers will be able to respond to the use of ordinary language usages. Therefore, program and course recommendations will have to change to reflect the changing technology.

Senior High

The Task Force dealt with the difficult task of establishing program guidelines by looking at senior high school applications first. Since computer courses had been developed by the Department of Education in several areas (eg., Computer Science, Computer Literacy, Data Processing, Office Practice), the Task Force recommended that all three senior high schools offer these courses. In addition, the Task Force recommended that CAL be integrated in the regular high school courses where appropriate software is available. This seems to apply

particularly to Mathematics and Science. Some applications are also suitable in vocational programs. (Appendix E) The task of outlining computer courses for senior high seemed fairly straight forward since approved courses have been available for some time. Nor was it deemed necessary to mandate computer instruction for all students since elementary and junior high schools were rapidly making computer literacy available to all students. Senior high probably does not have to respond to the general computer literacy needs of all students.

Junior High

The Task Force faced a much more difficult task in outlining appropriate courses and learning activities for junior high. After considerable discussion, the Task Force felt that junior high schools should focus on making computer literacy available to all students preferably in each year as students go through grades 7-9. This should be done by providing a computer literacy course which would be scheduled for two periods of approximately 40 minutes each per cycle for about two and a half months. If this were done at each grade level, a student would receive approximately 640 minutes of instruction in computer literacy per year for a total of almost 2000 minutes in the junior high years. Depending on the nature of the computer literacy course, a student who has taken these courses should be in a position to decide whether to continue in computer studies at the senior high level. The three year program should also enable students to adapt to the changing world of personal computers.

As has already been pointed out, much depends on the substance of the junior high computer literacy courses. To begin with, they will have to change rapidly as more and more students acquire increasing computer literacy at home and in elementary schools. At present, these courses should follow the scope and sequence as outlined in Department of Education Computer Awareness 7-9 Draft Pilot Guide (June, 1983). This outline includes:

1. Getting started (5%)
2. What is a computer (15%)
3. How have computers developed (10%)
4. How to make a computer work for you (50%)
5. Computers in our lives (20%)

In addition to the introduction of computer literacy courses, junior high schools should be encouraged to integrate computer related learning activities into the regular subjects. This can be done through the use of CAL, word processing, etc. as an integral part of teaching the regular school subjects. Computers can be utilized to individualize instruction through the introduction of special drill and practice activities for students who are weak in subject-related skill areas as well as to the use of advanced mathematics problem solving activities for gifted and talented students. Computers should be used to respond more and more to the individual needs and talents of students.

Elementary

In many ways the most difficult area, and yet a very exciting area, in which to introduce computer related learning activities is grades K-6. In these grades the emphasis is not placed on learning a computer language or preparing students for in-depth computer studies which may be career-related. Instead, the emphasis at the elementary level is focused on using computers as a learning and instructional tool. This approach comes closest to exploring how the new computer technology can enhance children's understanding and acquisition of cognitive skills. The approach recommended for K-6 is to integrate the use of computers by children into the regular curriculum so that children learn through the use of computers those concepts and skills which are best learned that way.

How is this accomplished? The following examples at two grade levels serve to illustrate how such integration may take place.

Grade 2 Mathematics

- The curriculum guide for Grade 2 Mathematics identifies the mastery of addition and subtraction as one of its goals. This goal can be facilitated through the use of conventional drill and practice worksheets. On the other hand, try using "Alien Addition"* produced by Developmental Learning Materials Inc. This computer program offers a challenge for children. It maintains a high interest level through a combination of graphics, sound and color. The options in the program allow it to be tailored to individual needs of students.

* All the examples cited below have been field tested and are on the approved list of the Western Canadian Computer Software Evaluation Consortium. They are presently available in River East School Division.

- Another skill area listed in Grade 2 Mathematics is "graphing, plotting and number lines". "Bumble Games" by The Learning Company is an example of the computer's capability to enhance the presentation of these concepts through the use of computer animations.
- A third skill area in Grade 2 Mathematics is problem solving. "Maptown" by The Learning Company offers a variety of problem solving activities.
- A fourth skill and concept area in Grade 2 Mathematics is geometry. "Elementary Volume #1" by MECC offers an interesting introduction to geometry concepts. "Turtle Graphics" can be used to enhance the children's understanding of plane and three dimensional geometry.

Grade 2 Language Arts

- The Language Arts curriculum guide identifies listening, speaking, reading and writing skills as primary objectives. Of these, the development of writing skills seems to be the most difficult challenge for students and teachers. "Bank Street Writer " by Brodebund is a widely recommended word processor which helps to create a positive writing environment. Spelling and grammatical errors can usually be corrected by one or two strokes on the computer keyboard. Using word processing even at such an early grade level can generate enthusiasm for writing, a task which is a drudgery for many students. Besides, introducing children to word processing will familiarize them with a communication media which will replace the typewriter in the next few years.

Grade 2 Social Studies

- Several topics in the Grade 2 Social Studies curriculum deal with "Technological Change - Advantages and Disadvantages". The K-3 Computer Literacy Guide includes some excellent activities about the impact of microchip technology on the environment.

Grade 4 Mathematics

- The Grade 4 Mathematics curriculum guide prescribes the following areas: computational skills, problem solving skills, measurement, geometry and graphing.

The following programs are available in these areas:

- Computation skills
 - Dragon Mix - Multiplication and Division (The Learning Company)
 - Arith-magic (Quality Educational Design)
 - Galaxy Math Facts (Random House)
- Problem solving skills
 - Rocky's Boots (The Learning Company)
 - Snooper Troops 1 (Spinnaker Software Corp.)
 - Gertrude's Puzzles (The Learning Company)
 - The Factory (Sunburst Communications)
- Measurement, Geometry and Graphing
 - Logo computer language helps to develop problem solving skills.
MECC has developed a comprehensive Logo activity package consisting of ten topics which can be completed in 70-80 hours of computer time. The package need not be treated as a program but individual topics may be integrated into the regular curriculum. For example, the modules on shapes and patterns would be appropriate for the topic on geometry.

Grade 6 Health

"Nutrition" by MECC is an excellent program for helping students evaluate their eating habits by analyzing their total food intake in relationship to specific food values such as calories, carbohydrates, vitamins, minerals, etc.

Grade 6 Social Studies

"The Fur Trade" is a simulation of business transactions and life in the days of the voyageurs. It requires a student to make decisions based on factors influencing events in the days of the fur trade.

Grade 6 Language Arts

Once again, word processing (eg., Bank Street Writer) assists students in the development of writing skills.

These are only a few examples of numerous suitable programs currently available at all grade levels (See Appendix F). They can be a part of the regular classroom activities at many points in the curriculum.

How can they be integrated into the regular curriculum? Three strategies are most commonly used. First, a computer learning station must be available to the classroom teacher. Preferably, a station made up of a computer, color monitor, disc drive and printer would be located in each classroom. The classroom teacher would refer students to work at the computer station for specific reasons in any subject area. The station would serve as one more means of encouraging students to learn a skill or concept. All students would work at the station at one time or another although not all students would spend the same amount of time at the computer just as not all students spend the same amount of time working at the blackboard.

The second strategy commonly and effectively employed is the tutorial. A student tutor can help another student in managing the use of a computer or a particular piece of software. In this way, the teacher does not have to explain every mechanical or procedural aspect to each student who might benefit from the use of a particular computer program. Students learn how to use computers as they use it for learning purposes. Students are not only taught how to use the computer but they use it for skill and concept development.

The third strategy is to introduce students to the new technology (ie., computer technology) in lessons which have been integrated into the regular curriculum in Social Studies, Language Arts and Science. These lessons help children to understand the impact of the new technology on the home and the workplace.

Once again, such a three-pronged integrated approach requires a computer station in each classroom. Failing that, not more than two or

three teachers should be required to share a computer station to integrate computer learning activities into the classroom.

A wide range of software must also be available to teachers for them to tailor the use of the computer station to meet individual needs and talents. Highly motivating drill and practice learning activities should be available to those who need the practice. On the other hand, advanced problem solving learning activities should be available to students who are ready for it. These opportunities to individualize the curriculum are some of the principle benefits of a computer station.

The most valuable software materials are those which enable the student to instruct the computer as opposed to the pre-programmed packages. Therefore, every computer station should include LOGO and the Bank Street Writer. These challenge the students to use the computer to perform certain problem solving or writing tasks. Such active learning activities generate more development than do passive programs.

What are the advantages and disadvantages, in general, of using computers across the curriculum? This question is very important in the light of the recommendations made above. The main advantages can be summarized as follows:

- Restricting the use of computers to one subject area (eg., Mathematics) or to a course in computer science reduces the potential application of computers in education. If the use of computers is encouraged across the curriculum, more teachers will be influenced by it and they, in turn, will aid in integrating the computer into our modern society.

- The use of computers in many subject areas enables students to see that it can perform a variety of tasks many of which might be adapted to the home of the future.
- Students discover that the computer is a communicative machine like the VCR, overhead, film projector and tape recorder, all of which facilitate the learning process. Students need to learn to select the best machine for the task.
- The use of computers in small groups can help students to learn from each other in small-group social settings.
- Many of the operations which can be done more effectively on a computer (eg., computations, graphing, writing) are applicable in a number of subject areas and therefore can be reinforced when the computer is used across the curriculum.
- The computer can help to meet objectives which are interdisciplinary (eg., writing skills). It can encourage teachers to share ideas about different ways of meeting these objectives.

There are some disadvantages in incorporating computer activities across the curriculum. These include:

- The same software might be use repeatedly in different subjects if the use of software is not planned carefully.
- Duplication of program costs across a division is costly. This would be necessary to give all schools access to good software.
- Sufficient number of computer stations would have to be set up in each school to give every teacher ready access to them.
- Students who use the computer before acquiring proper typing skills may have to be retrained when they enter high school so that they learn to use the keyboard efficiently.
- Scheduling the use of a limited number of computer stations can be difficult if several teachers must share a computer station.
- Students and parents may put pressure on teachers who are reluctant to integrate the use of computers in their subjects.

- Some homework may require the use of a computer at home. This situation puts students who do not have access to a computer at home at a disadvantage.

Although there are a number of disadvantages to planning computer activities across the curriculum, administrators and teachers can overcome most of them with some planning. The educational advantages outweigh the disadvantages. Therefore the Task Force is persuaded to recommend an integrated approach to computer applications in education especially at the elementary level. It probably is the most promising approach since it focuses on the use of computers to promote learning as compared to the model adopted at the secondary level which focuses on teaching students about computers and on training them in the use of computer languages. No doubt both approaches have a place in schools. However, the secondary level should consider the elementary integration model, especially at the junior high level. The capacity of computers to individualize learning experiences and to motivate students to learn should be utilized in regular subjects in junior high as well as elementary schools.

The general program guidelines identified in this section of the Report must be supplemented with much more detailed program outlines and learning activities. These should be developed as soon as possible by Division committees. The Microsoft Committee (K-9) should develop program guides for each grade level (K-9) and the High School Computer Committee (10-12) should assist in implementing changes in the computer courses at the high school level.

The Microsoft Committee should design and develop grade level packages of appropriate computer learning activities which could

be integrated into various subjects. These kits, including the recommended computer programs, should be made available to each school.

In conclusion, the Task Force urges the Division to introduce more computer learning activities at all grade levels through careful planning, through staff development and a definite timeline for systematic implementation of appropriate computer learning activities at all grade levels.

2. COMPUTER APPLICATIONS IN ADMINISTRATION AND SUPPORT SERVICES

A variety of computer applications are also available for administrative and support services in education. Administrative applications are available for division, school and classroom management. Division applications include the management of accounting, inventory and personnel records as well as a wide variety of projecting and planning techniques. School management can be networked into central management through the use of computers so that the two levels of administration which attend to many of the same areas of responsibilities can be integrated. In addition, schools can use computers to maintain student performance records and to prepare individualized student time tables. At the classroom level, teachers can use computers to monitor the progress students make in many areas of the curriculum. The performance record is easily maintained by teachers and students and readily accessible to them. The Task Force recognizes the importance of developing plans and a time line for introducing computer management practices at all three levels.

Substantial advances have been made in computer applications in support services such as resource programs, guidance and library. Much improved software has become available for resource programs especially in the areas of skill development and problem solving. These continue to be problem areas for many students where increased individualization of program materials helps to target the specific problems encountered by each student. When these computer programs are used in a tutorial arrangement, including peer tutoring, resource teachers are able to provide more effective support services to more students. Needless to say, software companies should be encouraged to expand the range of available materials and improve the quality of the materials. The Task Force recognizes that the present state of software production which is focused quite strongly on skill development, meets many of the goals of resource programs. All schools K-12 should provide a computer-based support service in the resource program.

Guidance has been making use of computer services such as "Choices". Other career-related applications should be explored. For example, simulations of career opportunities through the use of computers might be used to introduce students to alternative careers.

Steps should be taken to explore how library services might be enhanced and expanded through the use of computers. Computers could assist in improving inventory procedures as well as maintaining and monitoring the use of library services. Computer data banks could be introduced to replace some print materials. This might eventually lead to the establishment of electronic data exchange centres in place of

conventional libraries.

If the past few years are any indication, improved computer services through advances in the hardware and software will be developed rapidly in the near future. The Division should develop a flexible but systematic plan for the gradual introduction of computer support services as they become available and affordable.

BASIC REQUIREMENTS

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When a school division introduces the use of computers it must meet three basic requirements. These are: professional development, hardware acquisition, and software accessibility. Whenever any one or more of these requirements are not met, a system encounters serious problems. For example, little effective use of computers can be expected when a division purchases computers but does not provide the necessary professional development. The Task Force devoted considerable time discussing how these requirements can be met and coordinated so that the use of computers can be introduced systematically and effectively.

1. PROFESSIONAL DEVELOPMENT

The introduction of computer hardware and software is making new and unfamiliar demands on teachers and administrators. They have to understand how to use hardware which is so different from any equipment currently used in schools. They have to learn to use software and courseware which requires a new vocabulary, new concepts, new procedures and sometimes even a new language. Indeed, many teachers will be required to become familiar with Logo and Basic and some will require the use of additional languages. These are huge demands made on teachers who are preoccupied with an ever increasing range of curricular demands and with the administration of an increasingly wider range of special needs students. What can and must be done to provide appropriate professional support services?

Needless to say, the introduction of computers must be preceded with a thorough and systematic professional development program. Universities should offer suitable credit and non-credit courses. Continuing Education should offer courses tailored to the needs of Division teachers. The Division should offer workshops designed to provide appropriate levels of knowledge and skills to teachers as they introduce computers in their respective schools. One or two people in each school should acquire sufficient conceptual and practical knowledge so that they can offer leadership at the school level to plan an appropriate implementation schedule. Schools should not purchase computers and hope that someone will put them to good use.

The Task Force realized the urgency of providing appropriate professional development services in and out the Division. Therefore, the Task Force made several recommendations in this area. First, workshops should be planned to assist administrators in providing curriculum leadership in the implementation of computer-related learning activities. Administrators must offer leadership in this area just as they need to do in all areas of curriculum. Second, professional development opportunities should be available to all teachers in addition to the courses offered by universities. Local courses could be offered through Continuing Education and Division workshops should be available. Third, workshops should be planned for special education

teachers (including resource teachers) to assist in the use of computers by special needs students. Fourth, workshops should be available to teachers on the use of computers with gifted and talented students. This is not intended to be a complete list of workshops but to identify present priority areas. It is recognized that professional development priorities should be reviewed annually.

The need for a consultant to respond to the wide range of professional development requirements was also emphasized by the Task Force. Without the assistance of a consultant, it will be difficult, if not impossible, to meet these needs.

2. HARDWARE AND PERIPHERALS

In the past three years, the Division acquired a wide range of computers. During these initial exploratory years this course of action was appropriate in that it invited interested teachers to find out what educational applications may be suitable. This experience serves as a very important basis for planning appropriate policies and procedures for a systematic introduction of computer learning activities in the Division.

Several issues must be considered in selecting appropriate hardware. First, should acquisitions be restricted to one type of computer? To do so offers several advantages. It ensures access to all available software in the system, permits networking computers, facilitates maintenance and repairs and simplifies professional development planning. There are disadvantages. Teachers are confined to the scope and limitations of one type

of computer even though any one type is more suitable for one grade level (or subject area) and less for others. Therefore teachers have access to fewer applications or in some instances less adequate software. In balance, the Task Force recommended that the Division restrict all purchases to one type of computer because it was felt that the advantages outweighed the disadvantages.

The Task Force then faced the task of establishing the criteria for selecting one type or model. It concluded that the minimum criteria should include:

- 64K
- color capability
- wide range of available quality software
- service readily available
- reliable supplier
- built in capacity to do BASIC

These considerations would appear to restrict the options to two models - Apple II^e and IBMPC Junior. Of these two, it is recommended that the Division select Apple since many schools have already purchased one or more Apples. Much of the in-service to date has been focused on the use of the Apple. The software available through MECC and CAL is compatible with the Apple. Unfortunately, the Apple is priced higher than most computers and it is not the most convenient computer system. However, in balance, the Task Force recommended that the Division restrict new acquisitions to Apples.

This decision must be reviewed annually since the technical changes in this area are rapid. In two or three years the

Division may be compelled to make a different selection.

The Task Force also recommended that the Division acquire the following peripherals:

- disc drives
- minimum of one printer per three classrooms
- networks in senior high in the next year or two
- color monitor

The disc drive greatly increases the speed with which computer services can be delivered. The printer is required to introduce word processing. The computer network is needed to reduce the long-term costs of providing computer science courses to large numbers of students. Colour monitors are essential to take advantage of available software which makes considerable use of colour. The motivation and interest of a program is enhanced through the use of colour.

New typewriters in Senior High should be replaced with computers with a word processing package.

These are the basic peripherals which should be included in designing a computer service K-12. Others may be necessary for particular situations.

1. SOFTWARE AND COURSEWARE

Some educators attempt to distinguish software from courseware whereas others use the terms interchangeably. In this report, the term "software" will be used to refer to both.

The selection and evaluation of software constitutes an important and major aspect of implementing computer services in schools. It is a time-consuming task which has no end due

to the rapid development of new materials.

Unfortunately, much of the software is mediocre and repetitious and therefore careful evaluation is of the utmost importance. Computers will gather dust very quickly if suitable software does not become readily available to teachers.

Several steps have already been taken in the Division to select appropriate software. The Senior High Microcomputer Project reviewed and evaluated current software. Microsoft has reviewed software for elementary schools. The Division has also made MECC and CAL software available to all schools. The part-time consultant continues to review and evaluate new public domain and commercial materials. A continuous process of reviewing and evaluating software must be maintained through the use of the presently constituted committees and with the help of a consultant.

Some software acquisitions should be mandatory. Logo and word processing should be available in all elementary and junior highs. The senior high should have the necessary software to offer all Department of Education computer science courses. Computer word processing should be available in typing courses.

Teachers and students should be encouraged to prepare software. Such materials, when they are prepared properly, provide a good learning experience for the persons who made them and for those who use them. Sometimes they are more appropriate than commercially prepared materials. They are

also less expensive.

The acquisition and distribution of purchased software should be done by the same process as print and non-print materials. A special procedure has been developed by the Department of Education for obtaining MECC and CAL materials. This procedure should be coordinated at the Division level by the computer consultant.

Once again, the Task Force recognizes that software acquisitions can be made only within approved budgets. It is important that an appropriate balance be established between the purchase of hardware and software. Some additional funds should be made available in the next few years to introduce computer hardware and software in the classroom in an orderly and effective manner.

In conclusion, the Task Force strongly emphasized the importance of attending to all three areas of basic requirements: professional development, hardware acquisitions and access to quality software. The Division must pay due attention to the development of each area in order to implement an effective computer service.

IMPLEMENTATION

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Implementing the curriculum innovations available in education through the introduction of computers constitutes a major intervention in schooling. To do so effectively, administrators and teachers will have to go through the usual set of experiences associated with effecting change. They will have to become aware of the new technology, acquire information about its potential contribution to the classroom, develop a personal commitment to incorporate it into the curriculum, learn to manage various computer-related learning activities, incorporate these activities into the regular curriculum, explore how others are adapting the new technology to the classroom and constantly revise the use of computers in the classroom. All participants must receive the necessary support to follow through in this process of curriculum change. Therefore, the Task Force recommends that the Division take a number of steps to provide clear and supportive leadership for the implementation of computer-related learning activities and support services in schools.

1. IMPLEMENTATION PLANNING

The Division should outline an implementation plan for at least the next three years to coordinate staff development, hardware acquisition and accessibility to software. Once again, the Task Force emphasized the importance of coordinating these three areas of

development. The Proposed Implementation Schedule below suggests how these areas may be coordinated over a three year period. The Schedule points out that intensive staff development should take place during these years through the organization of in-service sessions, continuing education and classroom visitations. Second, a systematic three year plan for the acquisition of hardware should be prepared. It would announce to schools and teachers where the major emphasis will be placed in each year. This plan should be accompanied with a fairly detailed budget projection like the one proposed by the Task Force in this Report. The Task Force recommended that all hardware acquisitions be approved by central office to coordinate the availability of the new technology. Third, the expanding availability of software should be outlined. Available software should be classified to facilitate usage. Priorities should be spelled out clearly. For example, the Task Force recommended that LOGO and word processing should be part of the activities in grades 1-9.

Each school should prepare annual implementation plans in accordance with the Division plan. Again, the school plans should take into account staff development, hardware acquisition and accessibility to software.

PROPOSED IMPLEMENTATION SCHEDULE

1984			1985			1986		
JAN	SEPT	DEC	JAN	SEPT	DEC	JAN	SEPT	DEC
<u>STAFF DEVELOPMENT</u>								
• IN-SERVICE SESSIONS • CONTINUING EDUCATION • CLASSROOM VISITATIONS								
<u>CONSULTANT</u>								
<u>HARDWARE ACQUISITION</u>								
• SENIOR HIGH			• NETWORK					
• 45 COMPUTERS • 8 PRINTERS			• COMPUTERS REPLACING TYPEWRITERS					
• GUIDANCE • RESOURCE			• ADMINISTRATION			• LIBRARY		
• SPECIAL NEEDS								
• JUNIOR HIGH								
• ADD 2 LABS			• ADD 3 LABS			• REPLACE 2 LABS		
• 8 PRINTERS			• 3 PRINTERS			• 4 PRINTERS		
• RESOURCE • GUIDANCE			• 3 COMPUTERS			• 4 COMPUTERS • ADMINISTRATION • LIBRARY?		
• SPECIAL NEEDS								
• ELEMENTARY								
• 34 COMPUTERS • 20 PRINTERS • RESOURCE			• 34 COMPUTERS			• ADMINISTRATION • LIBRARY?		
• SPECIAL NEEDS								
<u>SOFTWARE ACQUISITION & RIGHTS</u>								
• GRADE 1-8								
• LOGO • WORDPROCESSING						• ADMINISTRATION • LIBRARY?		
• GRADES 1-12								
• MECC • CAL • PUBLIC DOMAIN • COMMERCIAL • TEACHER PREPARED • STUDENT PREPARED								
• GRADES 10-12								
• COMPUTER SCIENCE • DATA PROCESSING • WORD PROCESSING			• TYPING • COMPUTER ELECTRONICS • ADMINISTRATION			• LIBRARY PACKAGE		

BEST COPY AVAILABLE

Each school should submit annual proposals which would identify proposed school input as well as Division input. The annual plan should be fairly specific as to instructional, administrative and support service applications. The specific need for appropriate staff for planning and implementation should be included. Plans at both levels, the Division and the schools, are essential for the orderly and effective introduction of computers in schools.

2. CIRCULATION SERVICES

Circulation services constitute an important aspect of the use of computers in schools. Not only must good software be identified but it must also be made available to teachers and students. Therefore computer software should be catalogued and circulated just as other print and non-print materials are circulated through libraries. A Division system for categorizing and circulating computer software should be developed so that limited supplies of software can be made available to all interested teachers. At the school level the materials might be circulated through the school library or computer labs.

3. CONSULTATIVE SERVICES

It has been mentioned time and again in this Report that consultative services are essential for the implementation of the curricular changes brought about by introducing computers in schools. Without the support of a consultant, administrators and teachers will experience serious difficulties in planning

the necessary staff development, hardware acquisition and accessibility to software that is appropriate for each staff and school. The Division should provide a consultant who can assist administrators and teachers in all three areas. In addition, the consultant should be able to assist teachers in analyzing hardware systems and operationalizing them. In other words, the consultant should be quite familiar with the technical aspect of computers and peripherals.

The computer tasks and responsibilities of a consultant would include the following:

- coordinate and plan meetings (eg., Microsoft and interested teacher groups)
- coordinate classroom visitations
- conduct workshops
- prepare reports
- represent the Division at meetings
- review research and pilot programs
- provide some technical support service
- maintain computer office
- manage budgets
- identify and evaluate software and hardware
- maintain a knowledgeable background in curriculum development

In conclusion, the need for a computer consultant is urgent and the expectations of a consultant would be challenging. Without the services of a consultant, the implementation plans would have to be reduced substantially.

4. TECHNICAL SUPPORT SERVICE

Since the curriculum innovations involving computers introduces a major and highly technical component into curriculum, it is essential that technical support services be provided to schools. A knowledgeable technician can make many repairs because many aspects of computers and peripherals are made

up of components which can be replaced. Much time is lost in sending a machine out for repairs even though the repair itself takes very little time. A local technician frequently could make the repairs on site. This would reduce the down time of machines as well as the cost of repairs.

Computer hardware must be maintained just like any other piece of equipment. After approximately three years of constant use, computers frequently require some repairs. Without the aid of a technician, the Division would receive much less use of the computer equipment. The Task Force strongly recommends that the Division provide technical support service to all schools to maintain and repair computers and peripherals.

PROJECTED BUDGET AND FUNDING ... 52

Funding is an important aspect of implementing the Task Force recommendations. Additional financial resources are required for staff development, software acquisition, and hardware acquisitions. The implementation of learning activities involving the use of microcomputers can not be initiated only through conventional school funds. Additional funds will be required.

Two questions must be asked as they relate to funding once an important educational need has been identified and some appropriate responses to the need have been determined. These are:

1. What are the budget requirements?
2. How can they be met?

The following charts respond to both questions. First, an attempt has been made to detail the budgetary needs. The proposed budget identifies the needs in staff development, software and hardware over a three-year period. Consideration is given to differing needs at the Elementary, Junior High and Senior High levels. Special budgets are identified for guidance, resource, administration, vocational studies, library and special needs.

While it is recognized that a three-year projection is difficult to make in this new area of applied technology, the Task Force felt that an implementation time line is needed to facilitate planning. New developments and circumstances may well require significant changes in budget allocations. Therefore, the Assistant Superintendent (Curriculum) should review and revise the implementation plan and related budgetary requirements on an annual basis.

The Task Force believes that school divisions, including River East School Division, will need special assistance to introduce computer related learning experiences in all Manitoba schools in a fair and equitable manner for all students K-12. Such financial assistance should be made available through the Department of Education. As was pointed out in the section "Current Status" in this Report, other provinces have developed a plan for implementing computers in schools. The plans in Alberta, Ontario and Quebec, for example, include the infusion of vast sums of money over the next few years. This is deemed essential for implementing a universal computer education program. The Manitoba Department of Education has undertaken a number of steps in developing computer education plans K-12 and has announced the availability of some funds to help to implement them. The Division should make a submission to the Department of Education for additional funds outlining the intended use of such funds.

The Division should explore a variety of additional sources of funds to try to meet the budgetary requirements of computer applications in education. Therefore, submissions, as outlined on the following pages, should be made to:

1. Vocational Secondary Grants
2. Resource Program Grants
3. Special Needs Program Grants
4. Apple Foundation

The Division should also explore the availability of Federal grants for establishing computer labs for adult evening computer courses. Many adults wish to acquire knowledge and skills in this area. Where school

labs are not sufficient to meet this need, a submission should be made to establish additional computer labs for evening adult use. These labs could be used by students during the school day.

The extent to which the implementation plan can be followed is contingent upon the availability of funds from all the sources identified below. It is recommended that these submissions should be made immediately.

PROPOSED BUDGET FOR THREE-YEAR IMPLEMENTATION SCHEDULE

HARDWARE ACQUISITION

1984	1985	1986
<u>SENIOR HIGH (2)</u>		
Curriculum Implementation		
- Computers - 45 \$67,500	6 micros 39,000	6 micros 59,000
- Printers - 6 3,000	6 printers 3,000	6 printers 3,000
- Network	20,000	20,000
- Replace typewriters 6,500	12,500	30 micros 14,500
Guidance		
Resource 2,500	3 micros 4,500	
Administration	3 micros 4,500	
Library		5,000
Special Needs 4,000	2 micros 4,500	3 printers 3,500
<u>83,500</u>	<u>58,000</u>	<u>55,000</u>
<u>JUNIOR HIGH (7)</u>		
Curriculum Implementation		
- 2 Computer Labs 37,500	3 Labs (40) 60,000	2 Labs (25) 37,500
- 8 printers 4,000	3 printers 1,500	4 printers 2,000
Guidance	3 Apples 4,500	4 micros 4,500
Resource 3,000	2 Apples 3,000	1 micro 3,500
Administration		3 micros 4,500
Library		3 micros 4,500
Special Needs 4,000	2 micros 4,500	3 printers 4,500
<u>48,500</u>	<u>73,500</u>	<u>61,000</u>
<u>ELEMENTARY (18)</u>		
Curriculum Implementation		
- Computers - 36 54,000	30 micros 45,000	30 micros 45,000
- Printers - 20 10,000	20 printers 10,000	20 printers 10,000
Resource (5) 7,500	5 micros 7,500	5 micros 7,500
Administration		5 micros 7,500
Library		3 micros 4,500
Special Needs 5,000	2 micros 4,500	3 printers 3,500
<u>76,500</u>	<u>67,000</u>	<u>78,000</u>

PROPOSED BUDGET FOR THREE-YEAR IMPLEMENTATION SCHEDULE

SOFTWARE ACQUISITION AND RIGHTS

1984	1985	1986
<u>STAGE 1-2</u>		
- LOGO } 4,500	} 3,000	} 2,000
- Word Processing		
<u>STAGE 1-11</u>		
NECC		
CAL		
Public Domain } 20,000	} 17,000	} 19,000
Commercial		
Teacher Prepared		
Student Prepared		
<u>STAGE 12-11</u>		
Computer Sc 105 } 20,000	} 20,000	} 17,000
205		
305		
Comp.Literacy 105		
Data Processing 202		
302		
Office Practice 302		
Typing 302		
<u>RESEARCH</u> 6,000	5,500	4,500
<u>SALE/LEASE</u> 1,500	3,000	2,500
<u>SPECIAL NEEDS</u> 7,000	7,000	6,000
<u>ADMINISTRATION</u>	4,000	4,500
<u>LIBRARY</u>		13,500
sub total <u>59,000</u>	<u>59,500</u>	<u>69,000</u>

PROPOSED BUDGET FOR THREE-YEAR IMPLEMENTATION SCHEDULE

STAFF DEVELOPMENT

	1984	1985	1986
I <u>Division In-Service Days</u>		(part of 11 days for professional development & admin.)	
II <u>After school workshops</u>		(TIP, TAG)	
III <u>Continuing Ed. -self-sufficient</u>			
- computer literacy			
- word processing			
- Basic			
- LOGO			
IV <u>Curriculum Implementation</u>			
20,000	15,500	15,500	
- CAI			
- CAL			
- Teacher prepared materials			
- LOGO			
- Word Processing			
- Interaction			
- Computer Awareness			
- Basic			
V <u>Resource Teachers</u> 3,000	3,000	3,000	
- CAI			
- CAL			
- Word Processing			
- Problem Solving			
VI <u>Special Needs</u> 3,000	3,000	4,000	
VII <u>Consultant (1/2 time)</u> 7,000	18,000	18,000	
VIII <u>Library</u>		2,500	
IX <u>Guidance</u>	2,000	2,500	
X <u>Administration</u>	1,000	1,000	
Total 33,000	42,500	46,500	

PROPOSED BUDGET FOR THREE-YEAR IMPLEMENTATION SCHEDULE

TOTAL

1984	1985	1986
STAFF DEVELOPMENT		
(includes 1 time consultant)		
13,000	42,500	46,500
NOTE: Most of the staff development is offered through Continuing Education and after school workshops. Schools provide staff development on In-Service days.		
ROUTINE ADMISSION AND ALIEN		
59,000	59,500	69,000
POSTHOC ADMISSION		
Sr. High 83,500	58,000	55,000
Jr. High 48,500	73,500	61,000
Elementary 76,500	67,000	78,000
208,500	198,500	194,000
208,500	198,500	194,000
300,500	300,500	309,500

TOTAL FOR THREE-YEAR IMPLEMENTATION SCHEDULE

1984 PROPOSED BUDGET	\$200,500.00
1985 PROPOSED BUDGET	\$200,500.00
1986 PROPOSED BUDGET	<u>\$194,000.00</u>
	<u>\$595,000.00</u>

SOURCES OF REVENUE FOR A THREE-YEAR IMPLEMENTATION SCHEDULE

Central Division Revenues

1984		1985	1986
CURRICULUM IMPLEMENTATION			
Staff Dev.	11,500	20,000	20,000
Software	17,000	15,300	12,500
Hardware	72,000	59,000	63,000
	100,500		
SPECIAL NEEDS			
Staff Dev.	1,000	1,000	1,000
Software	2,000	2,000	2,000
Hardware	3,000	5,000	4,500
	6,000		
LIBRARY			
Staff Dev.			1,000
Software			7,000
Hardware			4,000
RESOURCE PROGRAM			
Staff Dev.	1,000	1,000	1,000
Software	1,500	1,500	1,500
Hardware	1,500	1,000	1,000
	4,000		
GUIDANCE			
Staff Dev.		1,000	1,000
Software	1,000	1,000	1,000
Hardware		2,500	2,500
	1,000		
ADMINISTRATION			
Staff Dev.		1,000	1,000
Software		3,000	1,000
Hardware		4,500	4,500
TOTALS			
STAFF DEV	13,500	24,000	25,000
SOFTWARE	21,500	22,500	27,000
HARDWARE	76,500	72,000	79,500
	111,500	118,500	131,500

SOURCES OF REVENUE FOR A THREE-YEAR IMPLEMENTATION SCHEDULE

School Revenues

	1984	1985	1986
<u>CURRICULUM IMPLEMENTATION</u>			
Staff Dev.	7,000	6,000	7,000
Software	7,000	6,000	7,000
Hardware	36,000	36,000	36,000
	<u>50,000</u>		
<u>SPECIAL NEEDS</u>			
Staff Dev.			
Software			
Hardware			
<u>LIBRARY</u>			
Staff Dev.			
Software			
Hardware			
<u>RESOURCES PROGRAM</u>			
Staff Dev.			
Software			
Hardware			
<u>GUIDANCE</u>			
Staff Dev.			
Software			
Hardware			
<u>ADMINISTRATION</u>			
Staff Dev.			
Software			
Hardware			
<u>TOTALS</u>			
STAFF DEV	7,000	6,000	7,000
SOFTWARE	7,000	6,000	7,000
HARDWARE	36,000	36,000	36,000
	<u>50,000</u>	<u>48,000</u>	<u>50,000</u>

SOURCES OF REVENUE FOR A THREE-YEAR IMPLEMENTATION SCHEDULE

Department of Education Proposal

1984	1985	1986
<u>CURRICULUM DEVELOPMENT</u>		
Staff Dev. 7,500	7,000	6,500
Software 17,500	17,000	16,500
Hardware 39,000	28,000	31,000
64,000		
<u>SPECIAL NEEDS</u>		
Staff Dev. 1,000	500	1,000
Software 2,000	2,000	2,000
Hardware 4,000	4,000	4,000
7,000		
<u>LIBRARY</u>		
Staff Dev.		1,000
Software		3,500
Hardware		5,000
<u>RESOURCE PROGRAM</u>		
Staff Dev. 1,000	1,000	1,000
Software 1,000	1,000	1,000
Hardware 5,000	9,000	5,000
7,000		
<u>GUIDANCE</u>		
Staff Dev.	1,000	500
Software 500	500	500
Hardware	2,000	2,000
500		
<u>ADMINISTRATION</u>		
Staff Dev.		6,000
Software		
Hardware		
<u>TOTALS</u>		
STAFF DEV 9,500	9,500	10,000
SOFTWARE 21,000	20,500	29,500
HARDWARE 48,000	43,000	47,000
78,500	73,000	86,500

SOURCES OF REVENUE FOR A THREE-YEAR IMPLEMENTATION SCHEDULE

Vocational Secondary Proposal

	1993	1994	1995
<u>CURRICULUM IMPLEMENTATION</u>			
Staff Dev.	1,000	500	
Software	3,000	2,000	2,000
Hardware	12,500	12,500	15,000
	16,500		
<u>SPECIAL NEEDS</u>			
Staff Dev.			
Software	1,000	1,000	
Hardware	1,500		
	2,500		
<u>LIBRARY</u>			
Staff Dev.			500
Software			3,000
Hardware			5,000
<u>RESOURCE PROGRAM</u>			
Staff Dev.			
Software	500		
Hardware	1,500		
	2,000		
<u>GUIDANCE</u>			
Staff Dev.			
Software		500	
Hardware			
<u>ADMINISTRATION</u>			
Staff Dev.			
Software		1,000	
Hardware		1,500	
<u>TOTALS</u>			
STAFF DEV	2,000	500	500
SOFTWARE	4,500	4,500	5,000
HARDWARE	15,500	14,000	20,000
	22,000	19,000	25,200

SOURCES OF REVENUE FOR A THREE-YEAR IMPLEMENTATION SCHEDULE

Resource Program Proposal

1984	1985	1986
<u>CURRICULUM IMPLEMENTATION</u>		
Staff Dev. 1,000	1,000	1,000
Software 3,000	3,000	2,000
Hardware 5,000	5,000	5,000
9,000	9,000	8,000
<u>SPECIAL NEEDS</u>		
Staff Dev.		
Software		
Hardware		
<u>LIBRARY</u>		
Staff Dev.		
Software		
Hardware		
<u>RESOURCE PROGRAM</u>		
Staff Dev.		
Software		
Hardware		
<u>GUIDANCE</u>		
Staff Dev.		
Software		
Hardware		
<u>ADMINISTRATION</u>		
Staff Dev.		
Software		
Hardware		
<u>TOTALS</u>		
STAFF DEV 1,000	1,000	1,000
SOFTWARE 3,000	3,000	2,000
HARDWARE 5,000	5,000	5,000
9,000	9,000	8,000

SOURCES OF REVENUE FOR A THREE-YEAR IMPLEMENTATION SCHEDULE

Special Needs Proposal

	1984	1985	1986
<u>CURRICULUM IMPLEMENTATION</u>			
Staff Dev.	1,000	1,000	1,000
Software	2,000	2,000	2,000
Hardware	4,500	4,500	3,000
	<u>7,500</u>	<u>7,500</u>	<u>6,000</u>
<u>SPECIAL NEEDS</u>			
Staff Dev.			
Software			
Hardware			
<u>LIBRARY</u>			
Staff Dev.			
Software			
Hardware			
<u>RESOURCE PROGRAM</u>			
Staff Dev.			
Software			
Hardware			
<u>GUIDANCE</u>			
Staff Dev.			
Software			
Hardware			
<u>ADMINISTRATION</u>			
Staff Dev.			
Software			
Hardware			
<u>TOTALS</u>			
STAFF DEV	1,000	1,000	1,000
SOFTWARE	2,000	2,000	2,000
HARDWARE	4,500	4,500	3,000
	<u>7,500</u>	<u>7,500</u>	<u>6,000</u>

SOURCES OF REVENUE FOR A THREE-YEAR IMPLEMENTATION SCHEDULE

Apple Foundation Proposal

1984		1985		1986	
<u>CURRICULUM IMPLEMENTATION</u>					
Staff Dev.					
Software					
Hardware	23,000		26,000		26,000
	23,000		26,000		26,000
<u>SPECIAL NEEDS</u>					
Staff Dev.					
Software					
Hardware					
<u>LIBRARY</u>					
Staff Dev.					
Software					
Hardware					
<u>RESOURCE PROGRAM</u>					
Staff Dev.					
Software					
Hardware					
<u>GUIDANCE</u>					
Staff Dev.					
Software					
Hardware					
<u>ADMINISTRATION</u>					
Staff Dev.					
Software					
Hardware					
<u>TOTALS</u>					
<u>STAFF DEV</u>					
<u>SOFTWARE</u>					
Hardware	23,000		26,000		26,000
	23,000		26,000		26,000

CONCLUSION

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In spite of all the difficulties of launching computer related learning activities in all schools K-6, the Task Force recognized that educators must proceed with the challenge. Invaluable learning experiences can be made available through the use of computers. Furthermore, the children presently in school are likely to work in a computerized workplace.

They must be computer literate before they arrive in the workplace. It is the responsibility of schools to enable children to become literate not only as it relates to the printed page but also as it relates to computers. To provide literacy in both areas requires that educators prepare themselves and develop careful plans for both forms of literacy. But, this should not be done at the expense of any of the five basic goals of the Division. It is our obligation to educate the whole person and not only one or another component. With these thoughts in mind, the Task Force recommends that the Division pursue a deliberate and systematic plan for implementing computer related learning activities K-12 in all schools.

RECOMMENDATIONS

The Task Force outlined the following recommendations to assist the Superintendent in forming policy recommendations for the Board of Trustees.

I CURRICULUM

Recommendation 1

All students in River East School Division should have access to computer learning activities by 1985.

Recommendation 2

Computer related learning activities should promote Division goals and aims.

Recommendation 3

A Program of Studies K-9 which identifies sequence, structure, design and organization should be implemented by 1985. The Department of Education approved computer programs 10-12 should be available in all Senior High Schools immediately.

Recommendation 4

Considerable effort should be made to integrate the use of computers with the regular program of studies.

II SOFTWARE AND COURSEWARE

Recommendation 5

The Division should retain committees of teachers to select and evaluate software and courseware. The evaluation should include a review of content and instructional format.

Recommendation 6

A list of recommended software and courseware should be prepared and regularly up-dated to assist teachers in selecting materials.

Recommendation 7

Software should be tested or tried in the classroom before it is recommended for use.

Recommendation 8

Software should be ordered and purchased through the regular procedures for curriculum materials.

Recommendation 9

The Division should continue to enter into "user agreements" with organizations such as MECC and CAL which produce and distribute software.

Recommendation 10

Teachers and students should be encouraged to produce software.

Recommendation 11

Every elementary school should offer LOGO and word processing.

III HARDWARE

Recommendation 12

Basic standards for the acquisition of computer hardware should be identified and reviewed annually.

Recommendation 13

The Division should select and purchase computer hardware through central office on the basis of established standards.

Recommendation 14

A minimum of two labs should be available at each Senior High by 1984. Computer Network systems should be introduced by 1985.

Recommendation 15

A minimum of one lab should be available at each Junior High by 1985.

Recommendation 16

A minimum of one computer learning station should be available for every elementary classroom. This goal should be achieved as soon as possible.

Recommendation 17

All resource programs should have at least one computer learning station.

Recommendation 18

Senior High Guidance services should have access to a minimum of one computer.

Recommendation 19

Plans should be made to introduce computer services in libraries.

Recommendation 20

The administration of accounts and records in central office and in schools should be computerized by 1986.

Recommendation 21

Every special education class should be provided with a minimum of one computer learning station.

Recommendation 22

All schools should be provided with a minimum of one printer for three classes.

Recommendation 23

All computer stations should include a disc drive.

IV PROFESSIONAL DEVELOPMENT

Recommendation 24

Professional Development opportunities should be made available in addition to courses offered by universities. Some courses could be offered through Continuing Education. Division In-Service sessions should be organized to assist schools in the implementation of computer related learning activities.

Recommendation 25

Workshops should be planned to assist administrators in providing curriculum leadership in the implementation of computer related learning activities.

Recommendation 26

Workshops should be planned for special education teachers to determine how computers can assist special needs students.

Recommendation 27

Workshops should be planned to assist teachers in using computers with gifted and talented students.

V PLANNING AND ORGANIZATION

Recommendation 28

The Division should provide clear and supportive leadership for the systematic implementation of computer services.

Recommendation 29

The Division should develop a comprehensive plan for implementing computer services. The plan should be reviewed annually.

Recommendation 30

Each school should develop a plan for the implementation of computer services for learning, instruction and administration.

Recommendation 31

The Division should create the position of Computer Consultant who would assist in the development of division implementation plans and school-based plans. The consultant should be responsible to the Assistant Superintendent - Curriculum.

Recommendation 32

One or two committees should be established to assist in the continuous review of programs and services.

Recommendation 33

Additional staff should be provided to schools to enable them to plan and implement computer related learning activities.

Recommendation 34

The A/V technician should receive appropriate training so that basic maintenance and repairs can be done locally.

Recommendation 35

A Division system for cataloging and circulating software should be developed and implemented through the school libraries or through the staff managing computer labs.

VI FUNDING

Recommendation 36

The Division in concert with other school divisions should approach the Department of Education for special funding to assist in the implementation of computer services. Any funding should support all three essential aspects of computer implementation--professional development, hardware acquisition and software accessibility.

Recommendation 37

The Division should provide special funds for the systematic implementation of computer services in the next three years. The funds should be sufficient to enable a balanced acquisition of hardware and software.

Recommendation 38

Schools should prioritize their budgets to assist in the implementation of computer services.

Recommendation 39

The Division should give special consideration to staff development in computer applications. This could include the use of Continuing Education.

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APPENDIX

APPENDIX A

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MINISTER OF EDUCATION

WINNIPEG
R3C 0V8

TO: Chairmen of School Boards
Superintendents/Directors of Education
of School Divisions/Districts of Manitoba
President of the Manitoba Teachers' Society
President of the Manitoba Association of School Trustees
President of the Manitoba Association of School Superintendents
Deans of Education of the Universities

Attached is a policy statement regarding computer education, as well as terms of reference for several committees the Department of Education wishes to set up. In drafting this position my staff has been influenced by the feed-back that many of you have provided them subsequent to the release last summer of the Report of the Advisory Committee on Computers in Education.

You will readily see that the policy recognizes what is already taking place in Manitoba - computer awareness curriculum development at both provincial and local levels, computer science courses taught in secondary schools, efforts by various individuals and groups to devise computer applications in various subject areas, and the teaching of course work by computer.

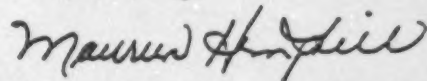
You will note that the committees being established are those mentioned in my letter to you, in July 1982. It is our intent to keep the committees small - particularly the hardware and software committees - so that their work can proceed reasonably quickly. As other knowledgeable persons need to be consulted, they can be drawn in from time to time. The professional development committee, on the other hand, is intended to reflect the interests of all jurisdictions which are or might become involved in in-service or pre-service programming and delivery.

At this time, I invite you to respond, if you choose, with comments or suggestions as to the policy statement. In the meantime, we will proceed to activate the committees, so that their work can begin. As they proceed to work, we may, from time to time, find a need for some changes. You may have some suggestions right now.

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Please contact Mr. John Dyck at 786-0373 or write to him at the Department of Education, Room 311 - 1181 Portage Avenue, Winnipeg, Manitoba for any comments or suggestions you wish to make. If possible, your comments should reach him within two weeks of the receipt of this letter.

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'Maureen Hemphill', written in dark ink.

Maureen Hemphill

MANITOBA DEPARTMENT OF EDUCATION

STATEMENT OF POLICY REGARDING EDUCATIONAL COMPUTING

HISTORY

The Department of Education has supported educational computing curricula in Manitoba since 1970 and access to computer resources since 1973.

EXISTING SERVICES

Existing services of the Department of Education include: the maintenance of curriculum committees in the Computer Science and Computer Awareness subject areas; the provision of a network of batch terminals supplying computer resources to 35 urban and rural high schools; the provision of software and consultative support for Apple, PET and TRS-80 microcomputers; the support of research and development of the Manitoba Computer Assisted Learning Consortium; the provision of consultative and professional development services to school divisions, schools and teachers in Manitoba schools; and the provision of consultative services on the use of the student scheduling and grade reporting system.

CURRENT EMPHASIS

The Manitoba Department of Education recognizes the need for provincial support and co-ordination of Education Computing in three broad areas, teaching ABOUT, USING, and WITH computers.

The Department will undertake to develop capabilities in the assessment of computer-based courseware, the identification of educational computer hardware to meet the technical criteria for Manitoba schools, and the identification of professional development strategies to enable teachers to participate effectively in educational computing applications.

Further to this stated policy, the Department of Education will maintain and apply staff and other resources to achieve the realistic goals of this policy. In the public school system, educational computing involves three major areas which have been prioritized as follows:

1. Teaching ABOUT Computers

Teaching ABOUT computers refers to the curriculum areas of Computer Science, Data Processing, Computer Studies, Computer Literacy, and Computer Awareness, where the Computer itself forms the content or topic of study. Department of Education K-12 curriculum guides covering study ABOUT computers are either currently in place, or undergoing preparation, pilot, or revision phases prior to implementation. Teacher training in the methods of teaching ABOUT computers is the most technical and intensive of the three areas mentioned above and will require the support and co-operation of agencies additional to the Department of Education. The study ABOUT computers as a content area has been the first priority of the Department of Education in Educational Computing in response to the expressed need for the field.

2. Teaching USING Computers

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Teaching USING computers refers to USE of the computer as a teaching tool in the classroom for purposes of simulation in social science or pure science; word processing in language arts or business education; information retrieval in current affairs or history; problem-solving in mathematics; diagnosis in physical education, career guidance, health or home economics; and the like. Such USES of the computer in the classroom facilitate the instruction process in content areas other than that of the computer itself. Teacher training in these USES of computers is much less technical and more specific to the particular courseware to be USED in that classroom and will require input from specialists in each of these content areas. Used in this way, the computer will serve both the student and the teacher in a variety of ways. This service in the improvement of the learning and instruction process is a second priority of the Department of Education in Educational Computing.

3. Teaching WITH Computers

Teaching WITH computers refers to the computer as the MODE of instruction in the area of Computer Assisted Learning, Computer Assisted Instruction, Computer Based Instruction, and Computer Managed Instruction. In each case, the computer can be employed in a variety of ways, from the drill-and-practice and remediation of skills already taught to the tutorial approach to teaching skills that were not previously taught by other means. Teacher training toward instruction WITH computers in all subject areas is the least technical since high-quality educational courseware is basically self-contained and requires minimal input from the teacher. The teacher will, instead, require sharpening of the skills of diagnosis of the learning difficulty and prescription of the most appropriate student courseware interaction. The Department of Education supports the use of high-quality, pedagogically-sound courseware as a MODE of individualized instruction WITH computers, as the third priority in Educational Computing.

IMPLEMENTATION PROPOSAL

In order to give some direction to the Manitoba Community in the orderly and effective implementation of Educational Computing in Manitoba schools, the Department of Education will implement the following two initiatives:

1. In agreement with the recommendations of the Computer Education Advisory Committee, three committees will be formed with terms of reference as attached:
 - Advisory Committee on Computer-Based Educational Courseware
 - Technical Advisory Committee on Educational Computer Hardware
 - Advisory Committee on Professional Development regarding Educational Computing
2. Manitoba endorses the concept and operation of the inter-provincial (B.C., Alberta and Manitoba) model for sharing the assessment of computer-based educational courseware, and will undertake the development of capabilities in assessment skills.

ADVISORY COMMITTEE ON PROFESSIONAL DEVELOPMENT

REGARDING EDUCATIONAL COMPUTING

This Committee will be an advisory committee and will report and be responsible directly to the Assistant Deputy Minister of Program Development and Support Services.

I. COMPOSITION

The nature of the task of this Committee demands representation from those interested groups which have a direct concern for the professional development of teachers in working towards competency in teaching ABOUT, USING, and WITH computers.

II. TERMS OF REFERENCE

1. Examine the Manitoba Computer Awareness Model contained in the McPherson Report and recommend the types of and delivery mechanisms for inservice and preservice for teachers to enable their participation in the appropriate categories of the model.
2. Review the present inservice and preservice program in educational computing programs provided by education institutions in Manitoba to determine to what extent these meet the professional needs of teachers.
3. Assess current and future directions for professional development of teachers or teachers in training with regard to educational computing.

III. TIME-LINE FOR ACTION

July/August 1983	Selection of members.
September 1983	First meeting, further meetings to be established by the committee.
November 1983	First report to the Assistant Deputy Minister of Program Development and Support Services outlining progress to date.
January 1984	Second report to the Assistant Deputy Minister of Program Development and Support Services outlining the state-of-the-art of professional development facilitating educational computer competence for teachers.
March 1984	Final report to the Assistant Deputy Minister of Program Development and Support Services recommending the types of and delivery mechanism for inservice instruction for teachers in educational computing.

ADVISORY COMMITTEE ON COMPUTER-BASED EDUCATIONAL COURSEWARE

This Committee will be an Advisory Committee and will report and be responsible directly to the Assistant Deputy Minister of Program Development and Support Services.

I. COMPOSITION

Appointing representatives from all traditional interest groups tends to lead to a large and unwieldy committee. It is therefore recommended that this Committee be kept to a maximum of 6 to 8 persons with expertise in the area of instructional computing.

II. TERMS OF REFERENCE

1. Recommend general technical and pedagogical criteria for computer-based educational courseware K-12 for Manitoba schools in both English and French.
2. Liaise with the Technical Advisory Committee on Instructional Computer Hardware so as to limit the consideration of courseware to that which is compatible with recommended hardware configurations for Manitoba.
3. Become familiar with the interprovincial microcomputer courseware evaluation model, monitor it, and recommend modifications if required.
4. Make recommendations as to the scope of information to be made available to the educational community by the Department of Education regarding evaluated microcomputer courseware.
5. Compile a list of computer courseware which meets the pedagogical criteria every six months.
6. Advise on procedures by which the Department of Education acquires the right to microcomputer courseware for distribution to the school system.

III. TIME-LINE FOR ACTION

July/August 1983	Selection of members.
September 1983	First meeting, further meetings to be established by the Committee.
November 1983	First report to the Assistant Deputy Minister of Program Development and Support Services, outlining Manitoba's technical and pedagogical criteria, and plan of action for the evaluation of microcomputer courseware.
January 1984	Second and final report to the Assistant Deputy Minister outlining the effectiveness of the evaluation process with recommendations.

TECHNICAL ADVISORY COMMITTEE ON EDUCATIONAL COMPUTER HARDWARE

This Committee will be an advisory committee and will report and be responsible directly to the Assistant Deputy Minister of Program Development and Support Services.

I. COMPOSITION

The technical nature of the duties of the members of this committee demand expertise in the area of computer hardware. It is recommended that, for reasons of efficiency and credibility, this committee be kept to a maximum of 4 to 6 persons possessing the technical skills essential to the task.

II. TERMS OF REFERENCE

1. Research, develop and recommend a Computer Hardware Implementation Strategy for Education in Manitoba.
2. Recommend a set of technical criteria for educational computer hardware systems for Manitoba schools.
3. Assess selected computer hardware systems through technical review by the committee or by persons delegated to the task by the committee.
4. Compile a list of computer hardware systems which meet the technical criteria for Manitoba schools. This list is to be updated at least every six months.
5. Recommend computer hardware system(s) appropriate to the requirements of Manitoba educational computing including each category of the Manitoba Computer Awareness Model.
6. Liaise with the Technical Advisory Committee on computer-based educational courseware in order to inform them concerning which computer hardware system meets the technical criteria for Manitoba schools.
7. Make recommendations to facilitate the acquisition of recommended computer hardware system(s) by provincial users.
8. Make recommendations with respect to feasibility, educational significance, and resource allocation needed to research and/or establish networks, distributed systems and other centralized systems for Manitoba.

III. TIME-LINE FOR ACTION

July/August 1983	Selection of Members.
September 1983	First meeting, further meetings to be established by the committee.
November 1983	First report to the Assistant Deputy Minister of Program Development and Support Services outlining: the Manitoba Computer Hardware Implementation Strategy, the Manitoba technical criteria for computer hardware systems, and a list of recommended computer hardware systems for Manitoba schools.
January 1984	Second report to the Assistant Deputy Minister of Program Development and Support Services outlining: research findings concerning recommended strategies for the acquisition of computer hardware systems by provincial users and recommendations with respect to network, distributed and other centralized computer hardware for Manitoba.
March 1984	Final report to Assistant Deputy Minister of Program Development and Support Services outlining: detailed procedures of an on-going computer hardware selection and evaluation model.

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APPENDIX B
METRO CURRICULUM SUPERINTENDENT'S MEETING

River East School Division #9

December 13, 1983

Present: Bob Cross, Otto Toews, John Ilavsky, Pat Krescy, Jake Krueger,
Roger Millier, Jim Friesen, Dick Mutchmor, Elmer Keryluk,
John Wiens

Regrets: G. Little

1. Dave Griffith and Cheryl Prokopanko Report on the use of micros in
Metro Divisions.

Winnipeg School Division #1

Consultant - B. Metcalfe

- Works mostly in elementary and junior high
- K-6 Pilot Study - chose Apple
 - 84 Sept. - 1 microcomputer/school
 - part of Dept. of Ed. pilot K-3
 - 4-6
 - 7-9 travelling lab of Vic 20's
 - plan lab for each jr. high school

St. James Assiniboia #2

- Sr. High - Network
- K-9 Pilot Study - Computer Literacy Document
- Fully implemented the Department of Ed. courses
- Gr. 3 calculator courses - all classes
- Computer Assisted Design - Sturgeon Creek
- Consultant
- Technician
- Trip - technical training courses - Federal Grant

Assiniboine South #3

- K-6 Committee - Teachers and admin.
 - Adapt Provincial Guidelines
 - Pilot Sept. 84
- 7-9 three modules on computer awareness
 - Fully implemented modules 1 & 2
- TRS80 mobile lab for 7-9
- Senior High - all Department courses
(105 - 1/2 credit)

St. Boniface #4

- K-3 - 10 lesson packages following the Department Guide
 - Start 1984
- 4-6 - isolated development
- 7-9 modules - 1st module implemented
 - mobile lab - several makes of microcomputers
- Senior High - implemented all Department courses

- offer complete French versions
- consultant full time

Fort Garry #5

Media Consultant involved

Computer Consultant - full time

K-6 integrating Dept. of Ed. programs in regular classes

- LOGO - professional development required

7-9 Department pilot program

- Mobile lab of Vic 20's

Senior High - all Department courses

St. Vital #6

Coordinator - Deputy Assistant Superintendent

Emphasis on 7-9 - Two mobile labs using Department guides

- No coordinated approach

Senior High - All Department courses

Norwood #8

- Part time consultant

- Department guides

- Implementation - teacher initiated

- French schools - Commodore 64

- English schools - Apple

- 1 machine/35 students

- Senior High - All Department courses

- Informatics - special course at senior high

Seven Oaks #10

Senior High - All Department courses offered

K-9 - isolated development

- plan division-wide implementation September 84

- some form of computer assisted learning

Transcona-Springfield #12

- Focus on teacher development

- 70 teachers representing each school and all subjects

- in-service after 3:00 p.m.

- hands on workshops

- 7-9 - February 1984 - Pilot Department curriculum

- Mobile lab of Atari's

- Senior High - all Department courses

- Consultant - Secondary consultant

River East #9 (added at a later date by R.W.C.)

Elementary

- a variety of machines;

- awareness activities;

- programming e.g. LOGO, Basic, and calculator activities;

- computer assisted learning e.g. tutorial, problem solving, LOGO;

- drill and practice; and

- school administrative applications.

Junior High

- Labs in several schools; computer literacy, some Basic, communications;
- Resource program; C.A.L., drill and practice.

Senior High

- offer all Dept. of ed. courses e.g. C. Science, Data Processing, and Office Practice;
- Choices;
- School administrative applications;
- Some computer literacy e.g. C.A. 105
- Pilot applications of Word Processing in Senior High English
- Computer Assisted Instruction Study Project funded by the Department of Education
- Resource Program
- Special Education applications

Microcomputer Task Force

Report due in January, 1984

Issues - Introduction of micro computers in schools

- I Curriculum Development
 - Optional implementation makes curriculum development difficult
- II Staff development - great need
 - computer literacy of teachers
 - focus on appropriate uses in education
 - integrate microcomputers with senior high program
- III Hardware Issues
 - Good purchase
 - Wait for good prices
 - Adapt to changes
 - Repairs and maintenance
 - Multiple makes
- IV Courseware
 - Identification
 - Quality
 - Canadian content

Other Issues

- Can we plan for technological innovation?
- Teach proper program techniques
- Impact of technology in all areas of schooling
 - e.g. microcomputer spell check
 - microcomputer grammar check

Applications - Future

1. Computer Assisted Learning - easiest applications (remedial, enrichment)

2. Use program with class or groups
 - problem solving
 - simulation
3. Computer Awareness - machine specific activities
 - Will change as students become familiar with microcomputers
4. Integration
5. Problem Solving and Logic
 - Use microcomputer as thinking tool
 - K-6 LOGO
 - Senior High - structured use of microcomputer languages
6. Language Arts
 - limited use of drill
 - word processing
 - overcome mechanical limitations in grades K-1
 - develop key boarding skills
 - develop composition skills
 - emphasize editing
7. Data Base Management
 - suitable for social studies
 - understand historical research
 - leads to questions
 - test assumptions
8. Simulation
 - e.g. science
 - Complex experiments
 - nuclear
 - chemical
 - ecological
9. Art and Graphics
10. Music
11. Career Guidance
12. Administration - teachers and school admin.
13. LOGO for Elementary
 - LOGO is structured language
 - offers structural approach to problem solving
 - not text or number based
 - motivating
 - child-centred micro world

Issues

1. Should we teach Basic?
 - Does it get in the way?
2. Number and arrangement of computers.
3. Variety and quality of software
4. Repair costs
 - 5-10% for parts
 - \$30-40 labor
 - Problems after 18 months
6. Senior High - bulk of students not addressed
7. Senior High - integration for bulk of students
 - Math, Chemistry, Language Arts
 - Access globe and mail data bank for grade 12 research

8. What categorical grants may become available for micro hardware from the Department of Education? No indication to date.

2. Language Arts Program - Integration - J. Ilavsky

- Department of Education - Focus on how children learn languages.
- Limited formal instruction
 - e.g. grammar
 - spelling
- Oral language skills primary vehicle for learning formal language structure.

Integration - within language arts
- across subject areas
- will subjects get attended to?

Approval - Textbooks
Department any text
Minister - emphasis is on approved textbooks
These are two different messages.

Time Allocated for subjects
Time allocation matters

3. Next Meeting

January 31, 1984
12:00 - 2:00 p.m.
Winnipeg School Division #1
1577 Wall Street East

1. Family Life Education - Ed Buller
2. Drug Education - Ed Buller + Resource Person
3. Division Reports on curriculum development and staff development

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RIVER EAST SCHOOL DIVISION NO. 9

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Micro Tech in River East School Division

	1981 - 82	1982 - 83	1983 - 84
Elementary ...14	Pre 1981 - Incidental awareness activities e.g. computer awareness activities. PET - 7 schools Proposals invited - identify hardware and software required. Workshops - on request by Division Awareness activities CAL Microsift Committee Problems - sophistication - limited "quality software".	- expanded use of CAL - e.g. individualized reading program. - obtained better software - joined MCAL - introduced Kid's Stuff and Logo - expand use of micros and peripherals - e.g. printers, disc drives - conducted school-based workshops - A. Funk, D. Burron, R. Carbotte - introduced variety of hardware - Atari, Apple, TI - dropped Basic language - increased classroom applications (e.g. Math)	- Microsift - review MCAL software and recommend complete package for 1 yr. - introduce word processing - increase use of Logo - use diverse software - electronic workbook - software which uses micros - e.g. problem solving - trend towards Apple - office applications
Junior High	Limited - PET - Awareness activities - Hardware selection - Software review	- increased no. of schools involved - scheduled computer activities for many students - high schools provided familiarization programs - introduced in resource programs (e.g. remedial act.) - expanded use of hardware (e.g. printer) - introduced disk drives	- introduce diverse software - still quite limited - expand hardware - some Apples - expand resource applications - some classroom applications (e.g. Math) - "awareness" for many students - limited time available - some Logo
Senior High	Pre 1981 - Mainframe (10-12 years) - specialized function - admin. applications - Computer Science instruction - Data Processing 1981 - Micros - Kildonan East - Basic programming - Science computations - Dept. of Education Proposal - identify and explain software - review hardware and software - CAL	- introduced in all high schools - expanded use of hardware - disc drive, printers - introduce awareness programs beyond Computer Sc. Courses - philosophy - hardware recommendations - software reviews - recommended that mainframe be discontinued - introduce office applications	- considerable hardware expansion - networking - CAL - limited applications - emphasis on - programming - word processing - data processing Possibly discontinue mainframe next year. Note: Div. Micro Task Force

APPENDIX E

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MICRO APPLICATIONS IN RIVER EAST SCHOOL DIVISION, NOVEMBER 1983

In-Service		K	I	II	III	IV	V	VI	VII	VIII	IX	O.E. Level			Tr. or Exp. Staff		
													1	2			3
Angus McKay	1	10	21	22	24	27	20	30							4	CAL RES, LIB, RISE STUFF, BASIC	
B.E. Davis	2	63	107	89	82	84	77	94							4	LOGO, CAL, COMP, 3-5 BASIC, RES.	
Birds Hill																	
Chief Pagola	0							130	100	100					4	BASIC, CAL, COMPUTER AWARENESS	
Dr. Hamilton	1	40	30	32	40	37									3	CAL, COMPUTER AWARENESS	
Dunwood	1	48	48	37	3	4	20	25							2	CAL, COMP. A., RES.	
Emerson	0	77	97	80	61	61	74	62	NDB, NOT DETERMINED					0	RES, COMP. A., ADMIN.		
Hampstead		49	37	31	32	30	0	33	PLAN TO GET STARTED THIS YR								
John de Graft	0	0	0	0	0	0	23	34							10	BASIC, COMPUTER A.	
J. Henderson	4							90	84	100	12	23				RES INTEGRATING LIB BASIC, LOGO	
J. Pittsford	1	38	42	34	41	46	3	50	40	33	14				2	1-3 RES WORDPROC, LOGO, COMP. A., KIDSTUFF, 7-9 COMP. A., INT	
Lore Watson	2					38	32	11							2	CAL	
Maple Leaf	2	76	90	77	100	100	80	90							3	COMP. A.	
McLeod	1	15	21	17	17	17	23	19							0	K-CAL	
Merrill Place	0	PLAN TO GET STARTED THIS YEAR									122	70	114		6		
Muir	1							110	120	80					3	RES, BASIC	
Nell Campbell		NONE															
Prison																	
Prince Edward	2	27	2	32	32	40	31	27							3	LOGO, CAL, COMP. A., 3-5 BASIC	
Pr. Mary	1	90	79	79	79	51	50	61							7	1-3 CAL AND RES, 2-5 CAL, KIDSTUFF	
Robert Andrews	1					84	89	65	60	92					4	3-5 COMP. A., 7-9 BASIC	
Safeway	1	0	0	0	0	0	20	10							2	CAL	
Sherrwood	1	43	19	23	45	32	14	32							3	COMP. AWARENESS	
Springfield	2	0	40	0	25	20	50	57	20	0					5	CAL, COMPUTER AWARENESS	
V. Gardens	1	93	94	40	42	38	59	57	20						2	LOGO, BASIC, CAL, COMP. A., RES.	

APPENDIX E (cont.)

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Micro Applications in River East School Division, November 1983

	In-Service	Tr. or Exp. Staff	O.E.				X	XI	XII	
			IX	X	XI	XII				
KILDONAN EAST	2	3					244 446	192 392	115 492	Res, Guid, C.Sc, Basis, Logo, DataPr, W.Pr. Literacy
MILES MACDONELL	4	5	0 36	0 35	0 21	0 15	100 178	100 198	100 228	Res, Guid, C.Sc, DataPr ESL, WP, C.Lit.Admin.
R.E. COLLEGIATE	1	10					220 415	120 389	120 431	Res, Guid, C.Sc, DataPr W.Pr, CompA, Basic, Logo

APPENDIX F

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- K - Juggles Rainbows - spacial awareness, colour
Big Birds Special Delivery - sorting and classifying
Gertrudes Puzzles - problem solving
Stikybear Numbers - number recognition and counting
- 1 - Gertrudes Puzzles - logical thinking
Delta Drawing - art and math programming - lead-up to LOGO
Alphabet Zoo - alphabet and basic spelling
- 2 - Peter and the Wolf - music-experiments in music and graphics
Hey Diddle Diddle - language and reading
Magic Spells - create spelling words to go in an adventure game -L.A.
Addition and Subtraction - Math
- 3 - Continents - Social Studies - learn about continents in game format
Word Spinners - a reading program
Bumble Plot - positive and negative numbers, graph plotting
- 4 - Rockys Boots - science (integrated circuits)-logic rules
Bumble Games - numbered pairs, mapping and charting
Missing Links - language puzzle-reading,writing,comprehension,spelling
- 5 - Compu-poem - planning ahead, unity, coherence, structure revision,
authorship
Logo - math and language
Swifts Math Series
- 6 - Snooper Troops Series - interactive mysteries (reasoning,
classification,mapping,note taking)
Bank Street Writer - word processing
Houghton-Mifflin - Math series